



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,257	12/01/2003	Baokang Bi		1256
41145	7590	05/26/2005	EXAMINER	
BAOKANG BI			CHANG, AUDREY Y	
3928 EAST SUNWIND DRIVE				
OKEMOS, MI 48864			ART UNIT	PAPER NUMBER
			2872	

DATE MAILED: 05/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

Office Action Summary	Application No.	Applicant(s)	
	10/707,257	BI, BAOKANG	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 16 March 2005.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) 31-47 is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-30 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 1-30 in the reply filed on March 16, 2005 is acknowledged.
2. **Claims 31-47 are withdrawn** from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made without traverse in the reply filed on March 16, 2005.

Claim Objections

1. **Claims 3, 8, 13, 19, 21 and 26-27 are objected to because of the following informalities:**
 - (1). The phrase "the apertures" recited in claims 3 and 19 is confusing and indefinite since it lacks proper antecedent basis from their respective claim. Also the phrase "the shape of apertures of said first and second zone plates is substantially *similar* to the shape of said diffractive modulating element" recited in claims 3 and 19 is very confusing and indefinite since it is not clear *what is considered* to be the "shape of the diffractive modulating element" and what are these apertures?
 - (2). Claims 8, 13, 21, 25 and 27 are incomplete since it is not clear what is the logical relationship between the "integrated circuit" with respect to other elements to make the scopes of the claims clear.
 - (3). The structural relationships between claims 7 and 11 are confusing and indefinite since it is not clear what is this center post as relative to other posts in the claims. And in particular how does the *mechanical plate* relate to the other parts of the supporting means.
 - (3). The phrase "said substrate" recited in claim 26 is confusing and indefinite since it lacks proper antecedent basis form its based claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. **Claims 1-4, 14-16, 17-20, 22-24, and 28-29 are rejected under 35 U.S.C. 102(b) as being anticipated by the patent issued to Bloom et al (PN. 5,311,360).**

Bloom et al teaches a *diffractive modulator* that is comprised of a *first plate assembly* (20, Figure 2) including a first zone plate (20) having a plurality of reflective zones or strips (18) alternatively arranged between transparent zones and a *second plate assembly* (16) having a second reflective zone plate having reflective surfaces (22), wherein the first and second plate assembly are complementary to each other and the second plate assembly receives the incident light after the first plate assembly. The diffractive modulator further comprises a *displacing means* or *movement means*, by setting up *electrostatic force* between the elements (18) and the second assembly plate (16) for moving the first plate assembly in the direction normal to the assemblies such that the displacing means changes the *relative distance* between the first and second plate assemblies. As demonstrated in Figure 3, when the relative distance between the first and second plate assemblies is an integer multiple of *half wavelength* of the incident light, (such that the *total* optical path length difference between the first and second assemblies is an integer multiple of the wavelength), then the diffractive modulator acts as a *flat mirror*, (please see Figure 3 and column 6, lines 18-29). As demonstrated in Figure 4, when the relative distance between the first and second plate assemblies is an *integer multiple plus quarter* of the wavelength, (such that the *total* optical path difference between the first and the second assemblies is half of the wavelength), then the diffractive modulator acts to *diffract* the incident light, (please see Figure 4 and --

column 6, lines 30-41). With regard to claims 14-16, the method for modulating an incident light is implicitly included in the disclosures of the diffractive modulator. With regard to claims 17, 28 and 29, Bloom et al teaches that a plurality of the diffractive modulators can be arranged to form either a two-dimensional array or one-dimensional array, (please see Figures 10-11, column 9 line 52 to column 10, line 27) of the modulator as a single diffractive modulator device for utilization in the applications such as display devices.

With regard to claims 2 and 18, the second plate assembly comprises at least one mirror, (22, Figures 2-4).

With regard to claims 3 and 19, since the first and second plate assemblies essentially define the diffractive modulator, the shapes of the apertures therefore must be “similar” to the shape of the diffractive modulator.

With regard to claims 4 and 20, Bloom et al teaches the diffractive modulator can be applied to modulating electromagnetic wave.

With regard to claims 16 and 22-24, Bloom et al teaches that the first plate assembly (20) is a movable plate assembly and the movement is caused by setting up electrostatic force between the elements (18) in the first assembly plate and the substrate (16) of the second assembly plate, (please see column 6, lines 18-41). The first assembly plate is supported by a spacer layer (12, Figure 2).

This reference has therefore anticipated the claims.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 5-13 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Bloom et al (PN. 5,311,360) in view of the patent issued to Greywall (PN. 5,684,631).**

The diffractive modulator taught by Bloom et al as described for claims 1 and 17 above has met all the limitations of the claims. Bloom et al teaches that the first assembly plate is a movable plate and the second plate assembly is a stationary plate, however it does not teach explicitly about the structures concerning the supporting means including linkages, resilient beams and posts as recited in various claims. Greywall in the same field of endeavor teaches a *optical modulator* having a *movable plate assembly* including a *zone plate* (8) with alternative *reflective and transparent zones* wherein the plate assembly is supported by a *substrate* (2a, Figures 6-8) and *supporting means*, (with regard to claim 5). Greywall teaches that the movement of the plate is caused by *electrostatic force* and it is controlled by the control-voltage source (18a), (please see Figure 6a), (with regard to claim 6). Greywall et al further teaches that the plate is supported by the *supporting means* that includes a plurality of *linkages* (such as 7b, 7c or 41b in various figures) that connect the movable plate (8) to *deformable resilient beams* (such as 6b, 6c or 42b) and a *plurality of posts*, (such as 4a, 4b or 4c), that anchor the resilient beams to the substrate, (with regard to claims 7 and 25). It would then have been obvious to one skilled in the art to apply the teachings of Greywall et al to modify the structural support of Bloom et al for the benefit of providing a support and movement means to move the movable zone plate, (with the reflective and transparent zones) (such as the first plate assembly) in unison and in alignment with respect to the stationary plate assembly to avoid possible error or noise caused by the movement of the movable plate. It is obvious that the stationary plate is affixed to the substrate (2c) of Greywall et al to properly fix the stationary plate in place. Although these references do not teach explicitly that the second plate assembly can also be the movable plate, such modification would have been obvious to one skilled in the art since

the operation of the diffractive modulator is based on the *relative* distance between the first and second plate assemblies, to move one or the other will result the same “relative distance” requirement, and it is therefore an obvious matters of design choice to one skilled in the art to make either the first or the second plate assembly to be movable for the benefit of the making the diffractive modulator suited for specific requirement of the application desired. With regard to the feature concerning the second supporting means for supporting the stationary plate, both Bloom et al and Greywall teach about relative supporting means between the stationary and movable plate assemblies. With regard to the feature concerning the mechanical plate and center post, (claim 11), one can recognize the plate (6c, Figure 8a of Greywall) for supporting the zone plate (8) as the mechanical plate wherein the zone plate is anchored onto the mechanical plate by some sort of supporting means whether it is a center post or not is a matters of design choice for making the plate to be anchored on the mechanical plate. It is also an obvious modification to one skilled in the art to make the plate assemblies affixed to substrates for the benefit of properly fixing the plate assemblies in place.

With regard to the feature concerning semiconductor substrate and having integrated circuit coupled to the substrate, Bloom et al does teaches that the substrate (16) is a silicon substrate (i.e. semiconductor) but it does not teach explicitly about the integrated circuits. However it is pretty common to implement integrated circuit on semi-conductive material, it would have been obvious to one skilled in the art to make the substrate with integrated circuit for the benefit of making the diffractive modulator applicable in different applications that requires the circuitry being also present.

6. Claims 21, 26-27 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Bloom et al (PN. 5,311,360).

The diffractive modulator taught by Bloom et al as described for claim 17 above has met all the limitations of the claims.

With regard to claims 21 and 27, Bloom et al does teaches that the substrate (16) is a silicon substrate (i.e. semiconductor) but it does not teach explicitly about the integrated circuits. However it is pretty common to implement integrated circuit on semi-conductive material, it would have been obvious to one skilled in the art to make the substrate with integrated circuit for the benefit of making the diffractive modulator applicable in different applications that requires the circuitry being also present.

With regard to claim 26, Bloom et al does not teach explicitly that the second plate assembly can also be the movable plate, however such modification would have been obvious to one skilled in the art since the operation of the diffractive modulator is based on the *relative* distance between the first and second plate assemblies, to move one or the other will result the same “relative distance” requirement, and it is therefore an obvious matters of design choice to one skilled in the art to make either the first or the second plate assembly to be movable for the benefit of the making the diffractive modulator suited for specific requirement of the application desired. Bloom et al teaches the stationary plate assembly is affixed to a transparent substrate, (16). It would then have been obvious to one skilled in the art to make the first plate assembly affixed to a substrate when the first assembly plate is chosen to be the stationary plate assembly.

With regard to claim 30, Bloom et al teaches that a plurality of the diffractive modulators may be arranged into 2-D arrays to form a single diffractive modulator device however it does not teach explicitly that they can also be arranged in staggered fashion. However such modification would have been obvious to one skilled in the art for the benefit of making the diffractive modulator that is capable being utilized for different modulation applications.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Audrey Y. Chang
Primary Examiner
Art Unit 2872*

A. Chang, Ph.D.